U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE
NATIONAL METEOROLOGICAL CENTER

OFFICE NOTE 205

A Delivery Monitoring Program for Satellite Temperature Data


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This code is designed to monitor delivery by NESS of satellite data from the two-satellite TOVS system to the NMC/EDIS DISK, giving special attention to the data of most interest to NMC. As a routine "operational" program, it should be run twice per day. When run between 0600 and 1800 GCT, it will determine how much oceanic satellite data was observed in the ±3-hour windows for the following three analyses:

    a. Large-scale analysis (e.g., Flattery) for 1200 GCT that was made at 1600 GCT of previous day. (Window = 0900-1500)

    b. Final analysis (e.g., OI) for 1200 GCT map made at 2130 of the previous day. (Window = 0900-1500)

    c. Final analysis for 1800 GCT made at 2230 on previous day. (Window = 1500-2100)

Satellite data observed in the 12-hr period 0900 to 2100 of the previous day day would therefore be examined in this run. In addition to determining the number of retrievals that were made in these periods, the program also determines whether they were on the NMC/EDIS disk in time to be used at normal dump times. The delay of 9 hours between the end (2100) of this observation period and the suggested earliest running time of 0600 is to allow for delayed processing by NESS. The run slot should end before 1800 to avoid possible disappearance of satellite data from the NMC/EDIS disk after it is 33 hours old.

The code is set up to determine the current time from the computer and selects the latest 12-hour block of satellite data 2100-0900 or 0900-2100 that is at least 9 hours old.
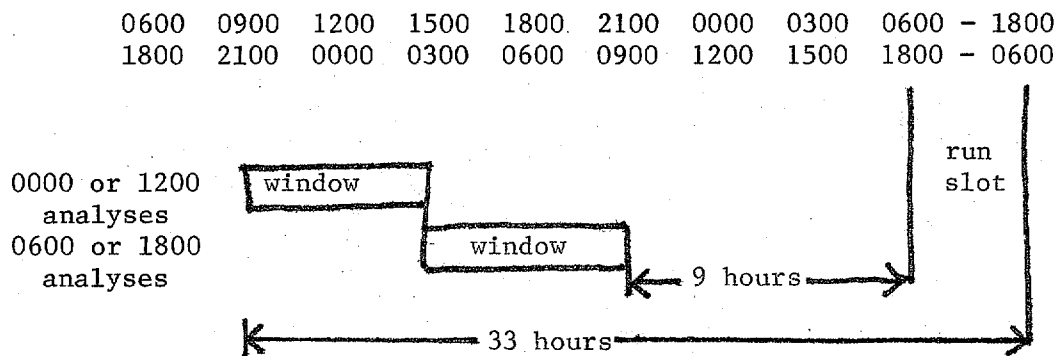
The above diagram shows the data examined for a run made between 1800-0600 and for a run made between 0600-1800 GCT.

TOVS data is put on the NMC/EDIS disk in <u>elements</u>. Each element consists of a sequence of retrieval records from one satellite that lie within only one of the eight standard 3-hour divisions of the day. An element can also start or end because of the beginning or end of a ground station read out. The <u>disk directory</u> lists the elements, the number (and disk location) of retrievals in each element, the time at which the element was put on disk, and the satellite identifier. Each retrieval in an element carries with it its own latitude, longitude, observing time, and whether it is over land or water. It is therefore possible not only to determine what satellite data was observed in a particular ±3-hour time analysis window in a fixed latitude range over, for example, the Pacific Ocean, but also to tell whether it was on the disk in time to be used for that analysis.

The <u>fixed</u> nominal time for each analysis is used to define availability. The possibility of later dump times when the NMC operations are behind schedule is ignored.

The JCL for this program is as follows.

```
//              JOB CARD
//               REGION=100K,CLASS=A,TIME=1
//LOGO     EXEC NFORXLG
//LKED.SYSLIB   DD
//              DD
//              DD DSN=NWS.NMC.W3LIB.LOAD,DISP=SHR
//LKED.NPLIB   DD DSN=W.NWS.W324.NPFCST.LOAD,DISP=SHR
//LKED.SYSIN   DD *
   INCLUDE NPLIB(NPTMON)
/*
//GO.FT88F001  DD   DISP=SHR,DSN=NSS.PSATAT.TOVS.NMCHF      DIRECTORY
//GO.FT89F001  DD   DISP=SHR,DSN=NSS.PSATAT.TOVS.NMCEDS         DATA
//GO.SYSIN  DD *
--TWO DATA CARDS---
/*
//
```

Subroutines used by the MAIN code are DREAD (to get retrieval data), W3AQ06 (to get current computer clock time), CALTIM and TIMCAL (both in NPTMON). CALTIM converts a six-number date-time group (year of the century, month, day, hour, minute, second) into the number of seconds since 0000 1 Jan 1979. TIMCAL does the opposite. Both are valid for the years 1979-1998.

The two data cards carry the following information:

Card 1 (2I10)   Integer values of the southern and northern
                 end of the latitude belt for which retrievals
                 are considered (e.g., 30 and 60)

Card 2 (3I10)   "Hold Times" (in hr*100 + minutes) for the three
                 analyses, in the following sequence

                      Large Scale (e.g., 0400)

                      00 or 12 Final (e.g., 0930)

                      06 or 18 Final (e.g., 1030)

The NMC/EDIS disk is examined for retrievals that qualify as follows:

   a.   Are in the correct time range for one of the three analyses,

   b.   Are over water,

   c.   Are in the latitude range specified by the data card,

   d.   Have at least one temperature below 100 mb or a pre-
        cipitable water value.

This examination is done by access to the satellite directory (FT88) that
defines the elements on the NMC/EDIS disk (FT89).

   Elements are selected according to the proper 3-hour time range in which
their retrievals were observed. Retrievals over water in the prescribed
latitude range are then isolated in each such element. This collection of
retrievals from one element is then put in chronological order. A time gap
between chronologically successive retrievals in this element that exceeds
the orbital time to cross the latitude belt indicates that two separate
excursions across the belt are contained in the retrievals in this element.
For each excursion the following information is saved:

   Satellite number

   Disk time (GCT) = time the element was put on the NMC/EDIS disk

   Average observation time of qualified retrievals in excursion

   Mean longitude of those retrievals

   Maximum and minimum latitudes (in order of observing time) of
    those retrievals

   Number of those retrievals.

A running total is also kept of the number of clear column (A), N_*(B) and microwave + HIRS'(C) retrievals among the qualifying retrievals. The code can handle up to 50 excursions.

After all elements are examined, the information for each excursion is printed out (see sample). This is done first for data in the Atlantic Ocean (mean longitude lying between 0 and 80°W) and then for the Pacific Ocean (mean longitude between 110W and 130E). In addition to the seven pieces of information listed above, the "disk delay," equal to disk time minus observation time, is printed for each excursion. Finally, for each excursion, its relevance to one or two of the three analyses is indicated and whether it was available on the disk by the standard dump times specified by data card 2.[1]

After excursions for both oceans are listed, the average disk delay for all ocean excursions and the percentages for the three retrieval methods is printed out.

Finally, a summary over the excursions is made for each of the three analyses, listing separately for each ocean the number of retrievals (in the ±3 hour time window and latitude belt) that were on the disk when this monitoring program was run, the number of these that were available at dump time, and the percentage that the latter number represents as a fraction of the former.

A sample output is attached.

For a two-satellite system, the CPU time for such a program format is about 1 second.

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[1] A line is skipped between successive excursion print lines unless a single orbital crossing of the belt has been artificially put into two different elements by the ground station read-out procedure or by the 3-hourly time blocking. The attached sample contains an example of a southbound orbit interrupted at 1800 GCT.

SATELLITE DELIVERY CODE RUN AT 79 7 24 12 2 17 GCT
FCR RETRIEVALS BETWEEN 79 7 23 9 0 0 AND 79 7 23 21 0 0
THERE ARE 76 ELEMENTS IN DIRECTORY
LATITUDE RANGE EXAMINED IS FROM 30 THRU 60

SAT	DISK TIME DD HH MM	MN OB TIME DD HH MM	MN LONG	LAT OF OBS	NUM OBS	DISK DELAY HH MM	AVAILABILITY FOR GLOBAL ANALYSES FLAT(H+400) ANAL AVAIL?		FIN(H+930) ANAL AVAIL?		FIN(H+1030) ANAL AVAIL?	
			ATLANTIC OCEAN (MN LONG BETWEEN 0 AND 80 WEST)									
1	23 18 27	23 15 54	22.4W	30.5 TO 59.9	55	2 32	**/**	**	**/**	*	23/18	1
1	23 19 55	23 17 36	44.3W	30.1 TO 58.7	49	2 19	**/**	**	**/**	*	23/18	1
			PACIFIC OCEAN(MN LONG BETWEEN 110W AND 130E)									
1	23 14 42	23 11 16	122.1W	34.2 TO 31.8	3	3 25	23/12	1	23/12	1	**/**	*
1	23 17 2	23 12 56	139.6W	56.9 TO 30.0	51	4 5	23/12	0	23/12	1	**/**	*
1	23 18 27	23 14 38	163.3W	56.3 TO 30.1	56	3 49	23/12	0	23/12	1	**/**	*
1	23 19 55	23 16 20	171.9E	59.2 TO 30.4	59	3 35	**/**	**	**/**	*	23/18	1
1	23 21 4	23 17 58	156.1E	56.9 TO 50.3	6	3 6	**/**	**	**/**	*	23/18	1
1	23 21 4	23 18 2	147.9E	53.5 TO 30.2	31	3 1	**/**	**	**/**	*	23/18	1

(1=AVAIL, 0=NOT AVAIL FOR ANAL, *=IRRELEVANT)

AVG DISK DELAY IS 3 HRS AND 14 MINS
TROPOSPHERIC RETRIEVALS ARE 50% CLEAR COLUMN, 15% N-STAR, AND 34% MSL+HIRS'

RECEIPT SUMMARY FOR THE 3 ANALYSES WHOSE ELIGIBLE DATA FALLS COMPLTLY IN THIS 12 HR PERIOD

ANALYSIS TYPE	MAP TIME	DATA WINDOW	ATLANTIC OBS IN WINDOW	OBS ON DISK IN TIME	PER CENT	PACIFIC OBS IN WINDOW	OBS ON DISK IN TIME	PER CENT
FLATT	23/12	23/ 900-23/1500	0	0	0	110	3	3
FINAL	23/12	23/ 900-23/1500	0	0	0	110	110	100
FINAL	23/18	23/1500-23/2100	104	104	100	96	96	100

NORMAL STOP